MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2015/2016

TOS 1141 – OPERATING SYSTEMS

(All sections / Groups)

7 OCTOBER 2015
9.00 a.m. – 11.00 a.m.
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This Question Paper consists of 8 pages including cover page with 6 Questions only.

2. Attempt **ALL** the sub-questions in **Question 1.**

3. Attempt **FOUR** out of **FIVE** questions among Question 2 to 6.

4. All questions carry equal marks and the distribution of the marks for each question is given.

5. Please print all your answers in the Answer Booklet provided.

QUESTION 1

Multiple Choice Questions (12 marks)
Instruction: Choose the BEST answer. Please write your answers in the Answer Booklet provided.

1) The general role of an operating system is to _____.

   A. act as an interface between various computers.
   B. provide a set of services to system users.
   C. manage files for application programs.
   D. None of the above.

2) _____ is the main component of most operating systems that is running at all times on the computer. It is a bridge between applications and the actual data processing at the hardware level.

   A. Control program
   B. Kernel
   C. I/O device
   D. Memory

3) A set of processes is _____ when each process in the set is blocked awaiting an event that can be triggered by another blocked process in the set.

   A. spinlocked
   B. preempted
   C. stagnant
   D. deadlocked

4) With _____ only one process may use a resource at a time and no process may access a resource unit that has been allocated to another process.

   A. hold-and-wait
   B. mutual exclusion
   C. no preemption
   D. circular wait

5) Main memory divided into a number of equal size frames is the _____ technique.

   A. simple paging
   B. dynamic partitioning
   C. fixed partitioning
   D. virtual memory segmentation

Continued ....

6) The scheduling strategy where each process in the queue is given a certain amount of time, in turn, to execute and then returned to the queue, unless blocked is referred to as _____.

A. Prioritization
B. Round-Robin
C. LIFO
D. All of the above

7) In the dynamic partitioning technique of memory management, the placement algorithm that chooses the block that is closest in size to the request is called _____.

A. first-fit
B. best-fit
C. last-fit
D. next-fit

8) When an external device becomes ready to be serviced by the processor, the device sends _____ to the processor.

A. interrupt signal
B. halt signal
C. handler signal
D. None of the above

9) A benefit of microkernel is _____.

A. extensibility
B. portability
C. flexibility
D. All of the above

10) The replacement policy that is impossible to implement because it would require the OS to have perfect knowledge of future events is called the _____.

A. Optimal policy
B. Least Recently Used (LRU) policy
C. Clock policy
D. None of the above

Continued ....

11) The address of a storage location in main memory is the _____.

A. Address space
B. Virtual address space
C. Physical address
D. Virtual address

12) A _____ is issued if a desired page is not in main memory.

A. Paging error
B. Page replacement policy
C. Page fault
D. Page placement policy

Continued ....

QUESTION 2

(a) Identify the TWO (2) main purposes of an operating system. [2 marks]

(b) Identify whether each of the following instructions should be executed in *privileged* or *user* mode. [4 marks]

i. Set value of timer.
ii. Read the clock.
iii. Clear memory.
iv. Issue a trap instruction.
v. Turn off interrupts.
vi. Modify entries in device-status table.
vii. Switch from user to kernel mode.
viii. Access I/O device.

(c) List THREE (3) major activities of an operating system with regard to process management.

[6 marks]

QUESTION 3

(a) Suppose that the following processes arrive for execution at the times indicated and priorities given. Each process will run for the amount of time listed.

Process	Arrival Time (ms)	Burst Time (ms)
P_1	2	2
P_2	4	11
P_3	0	6
P_4	5	4
P_5	1	7

i. Draw THREE (3) Gantt Chart illustrating the execution of these processes using the following scheduling algorithms:

a. First Come First Serve (FCFS) [2 marks]
b. Shortest Job First (SJF) [2 marks]
c. Round-robin (quantum=3) [2 marks]

ii. Calculate the average waiting time the overall processes for each of the scheduling algorithms.

[3 marks]

(b) Compare preemptive and non-preemptive scheduling. [3 marks]

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QUESTION 4

(a) Define a deadlock problem. Explain any TWO (2) methods to handle deadlocks. [5 marks]

(b) Consider a system with five processes P_1 to P_5 and three resources A, B and C. Resource type A has 10 instances, resource type B has 7 instances and recourse type C has 9 instances. The resources are allocated according to the following policy:

Process	Allocation	Max	Available
	A B C	A B C	A B C
P_1	0 1 0	7 5 3	3 5 4
P_2	0 0 2	4 3 3	
P_3	2 0 0	3 2 2	
P_4	3 0 2	9 0 2	
P_5	2 1 1	2 2 2	

i. Is the system's state deadlock-safe? If it is safe, show the steps using Banker's algorithm and Safety algorithm to get the safe order of execution of the processes. Otherwise, provide your reasons. [5 marks]

ii. Draw the Resource Allocation Graph for the system. [2 marks]

Continued ....

QUESTION 5

(a) Differentiate between logical and physical memory addresses. [2 marks]

(b) Given a heap of memory management scheme with the following list:

Address	Content	Size(KB)
#101	U	15
#102	H	27
#103	U	13
#104	U	30
#105	U	15
#106	H	68
#107	H	40
#108	U	27
#109	U	6
#110	H	80
#111	U	12
#112	H	98
#113	H	131
#114	H	62
#115	U	35

*U – used, H – hole

The following process requests are received in order:

Process number	Size (KB)
1	35
2	15
3	108
4	56

Show how the memory requests above are allocated using each of the following scheme:

i. First-fit [3 marks]
ii. Best-fit [3 marks]

(c) Consider the following page reference string:

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0

Assuming a page scheme with FOUR (4) frames is initially empty, trace the allocation of pages to frames using Least Recently Used (LRU) page replacement algorithms. [4 marks]

Continued ....

QUESTION 6

(a) What problem could occur if a system allowed a file system to be mounted simultaneously at more than one location? [2 marks]

(b) How caches help improve performance? Why do systems not use more or larger caches if they are so useful? [4 marks]

(c) Given a request queue (0-199) for disk I/O:

98, 183, 37, 122, 14, 124, 65, 67

Assume that the head is currently pointing at 53, calculate the total head movement of the disk using the following scheduling algorithms:

i. First-come-first-serve (FCFS) [2 marks]
ii. Shortest Seek Time First (SSTF) [2 marks]
iii. SCAN [2 marks]

End of Paper.